Listing of the Claims:

The following is a complete listing of all the claims in the application, with an indication of the status of each:

1   1 (Currently Amended). A network connection system for connecting a first
2   communication network and a plurality of user terminals when a second
3   communication network is interposed between said first communication
4   network and said plurality of user terminals, said second communication
5   network employing a second protocol different from a first protocol employed
6   in said first communication network, said system comprising:
7   a scheduling apparatus including:
8   an overhead amount correction unit <u>receiving rate information</u>
9   <u>which represents a current rate set between the second communication</u>
10   <u>system and said plurality of user terminals</u> for correcting an overhead
11   amount between data conforming to said second protocol and data
12   conforming to said first protocol to convert received information on a
13   rate based on said second protocol to a rate based on said first
14   protocol; and
15   a scheduler for shaping a transmission rate for the data
16   conforming to said first protocol from said first communication
17   network such that the data conforming to said first protocol is
18   delivered at a transmission rate equal to or lower than said rate
19   calculated by said overhead amount correction unit;
20   a protocol converter for converting data conforming to said first
21   protocol after said scheduling apparatus has shaped the transmission rate
22   therefor to data conforming to said second protocol for use in said second
23   network; and
24   a multiplexer including a current data <u>rate</u> detector for supplying said
25   scheduling apparatus with said rate information as indicative of a currently set

26   reception rate for said user terminals, said multiplexer being configured to
27   transmit to each of said user terminals the data conforming to said second
28   protocol from said protocol converter or the data conforming to said first
29   protocol after said scheduling apparatus has shaped the transmission rate
30   therefor.

1   2 (Original). A network connection system for connecting a first
2   communication network and a plurality of user terminals when a second
3   communication network is interposed between said first communication
4   network and said plurality of user terminals, said second communication
5   network employing a second protocol different from a first protocol employed
6   in said first communication network, said system comprising:
7   a scheduling apparatus including:
8   a classification processing unit for classifying data conforming
9   to said first protocol received from said communication network based
10   on quality guaranteed classes set thereto;
11   an overhead amount correction unit for correcting an overhead
12   amount between a data rate associated with said first protocol and a
13   data rate associated with said second protocol to convert received rate
14   information on said second protocol to the rate based on said first
15   protocol;
16   a weighting coefficient calculation unit for calculating a
17   weighting coefficient based on said rate calculated by said overhead
18   amount correction unit such that a minimally guaranteed rate is assured
19   for a minimum rate guaranteed class among classes classified by said
20   classification processing unit;
21   a weighting scheduler for scheduling data conforming to said
22   first protocol of said minimum rate guaranteed class and of a
23   weighting applied class among said classified classes based on the

24   weighting coefficient calculated by said weighting coefficient

25   calculation unit to deliver the data in accordance with the scheduling;

26   and

27   a scheduler for scheduling the data conforming to said first

28   protocol from said weighting scheduler such that the data conforming

29   to said first protocol is delivered at a transmission rate equal to or

30   lower than said rate calculated by said overhead amount correction unit

31   to deliver the data in accordance with the scheduling;

32   a protocol converter for converting the data conforming to said first

33   protocol after said scheduling apparatus has shaped the transmission rate

34   therefor to data conforming to said second protocol; and

35   a multiplexer including a current data detector for supplying said

36   scheduling apparatus with said rate information as indicative of a currently set

37   reception rate for said user terminals, said multiplexer being configured to

38   transmit to each of said user terminals the data conforming to said second

39   protocol from said protocol converter or the data conforming to said first

40   protocol after said scheduling apparatus has shaped the transmission rate

41   therefor.

1   3 (Original). A network connection system for connecting a first

2   communication network and a plurality of user terminals when a second

3   communication network is interposed between said first communication

4   network and said plurality of user terminals, said second communication

5   network employing a second protocol different from a first protocol employed

6   in said first communication network, said system comprising:

7   a scheduling apparatus including:

8   a classification processing unit for classifying data conforming

9   to said first protocol received from said communication network based

10   on quality guaranteed classes set thereto;

11   an overhead amount correction unit for correcting an overhead

12   amount between a data rate associated with said first protocol and a

13   data rate associated with said second protocol to convert received rate

14   information on said second protocol to the rate based on said first

15   protocol;

16   a weighting coefficient calculation unit for calculating a

17   weighting coefficient based on said rate calculated by said overhead

18   amount correction unit such that a minimally guaranteed rate is assured

19   for the minimum rate guaranteed class among classes classified by said

20   classification processing unit;

21   a weighting scheduler for scheduling data conforming to said

22   first protocol of said minimum rate guaranteed class and of a

23   weighting applied class among said classified classes based on the

24   weighting coefficient calculated by said weighting coefficient

25   calculation unit to deliver the data in accordance with the scheduling;

26   and

27   a preferential control scheduler for scheduling the data

28   conforming to said first protocol from said weighting scheduler, and

29   data conforming to said first protocol of a best-effort class among said

30   classified classes such that the data conforming to said first protocol is

31   delivered at a transmission rate equal to or lower than said rate

32   calculated by said overhead amount correction unit, and for

33   preferentially scheduling the data conforming to said first protocol

34   from said weighting scheduler, and delivering the data conforming to

35   said first protocol of the best-effort class at a timing at which there is

36   no data conforming to said first protocol from said weighting

37   scheduler;

38   a protocol converter for converting the data conforming to said first

39   protocol after said scheduling apparatus has shaped the transmission rate

40 therefor to data conforming to said second protocol; and

41 a multiplexer including a current data detector for supplying said

42 scheduling apparatus with said rate information as indicative of a currently set

43 reception rate for said user terminals, said multiplexer being configured to

44 transmit to each of said user terminals the data conforming to said second

45 protocol from said protocol converter or the data conforming to said first

46 protocol after said scheduling apparatus has shaped the transmission rate

47 therefor.

1 4 (Original). A network connection system for connecting a first

2 communication network and a plurality of user terminals when a second

3 communication network is interposed between said first communication

4 network and said plurality of user terminals, said second communication

5 network employing a second protocol different from a first protocol employed

6 in said first communication network, said system comprising:

7 a scheduling apparatus including:

8   a classification processing unit for classifying data conforming

9 to said first protocol received from said communication network based

10 on quality guaranteed classes set thereto;

11   a rate measuring unit for measuring a transmission rate for a

12 preferential class among said classified classes;

13   an overhead amount correction unit for correcting an overhead

14 amount between a rate based on said second protocol and a rate based

15 on said first protocol to convert received rate information on said

16 second protocol to the rate based on said first protocol;

17   a weighting coefficient calculation unit for calculating a

18 weighting coefficient based on said rate calculated by said overhead

19 amount correction unit and the transmission rate for the preferential

20 class measured by said rate measuring unit such that a minimally

21   guaranteed rate is assured for the minimum rate guaranteed class

22   among the classes classified by said classification processing unit;

23   a weighting scheduler for scheduling data conforming to said

24   first protocol of said minimum rate guaranteed class and of a

25   weighting applied class among said classified classes based on the

26   weighting coefficient calculated by said weighting coefficient

27   calculation unit to deliver the data in accordance with the scheduling;

28   and

29   a preferential control scheduler for scheduling the data

30   conforming to said first protocol of said preferential class, the data

31   conforming to said first protocol from said weighting scheduler, and

32   data conforming to said first protocol of a best-effort class among said

33   classified classes such that the data conforming to said first protocol is

34   delivered at a transmission rate equal to or lower than said rate

35   calculated by said overhead amount correction unit, and for

36   preferentially scheduling the data conforming to said first protocol of

37   said preferential class, preferentially scheduling the data conforming to

38   said first protocol from said weighting scheduler at a timing at which

39   there is no data conforming to said first protocol of said preferential

40   class, and delivering the data conforming to said first protocol of the

41   best-effort class at a timing at which there is no data conforming to

42   said first protocol from said weighting scheduler;

43   a protocol converter for converting the data conforming to said first

44   protocol after said scheduling apparatus has shaped the transmission rate

45   therefor to data conforming to said second protocol; and

46   a multiplexer including a current data detector for supplying said

47   scheduling apparatus with said rate information as indicative of a currently set

48   reception rate for said user terminals, said multiplexer being configured to

49   transmit to each of said user terminals the data conforming to said second

50   protocol from said protocol converter or the data conforming to said first

51   protocol after said scheduling apparatus has shaped the transmission rate

52   therefor.

1   5 (Original). A network connection system for connecting a first

2   communication network and a plurality of user terminals when a second

3   communication network is interposed between said first communication

4   network and said plurality of user terminals, said second communication

5   network employing a second protocol different from a first protocol employed

6   in said first communication network, said system comprising:

7   a scheduling apparatus including:

8   a classification processing unit for classifying data conforming

9   to said first protocol received from said communication network based

10   on quality guaranteed classes set thereto;

11   a rate measuring unit for measuring a transmission rate for a

12   preferential class among said classified classes;

13   an overhead amount correction unit for correcting an overhead

14   amount between a rate based on said second protocol and a rate based

15   on said first protocol to convert received rate information on said

16   second protocol to the rate based on said first protocol;

17   a preferential class upper limit setting unit, operative when the

18   difference between the transmission rate of the data conforming to said

19   first protocol of the preferential class as measured by said rate

20   measuring unit and said rate calculated by said overhead amount

21   correction unit is lower than a minimally guaranteed rate for a

22   minimum rate guaranteed class among the classes classified by said

23   classification processing unit, for setting an upper limit to the

24   transmission rate for said preferential class for shaping, such that the

25   minimally guaranteed rate can be assured for said minimum rate

26   guaranteed class;

27   a weighting coefficient calculation unit, operative when said

28   preferential class upper limit setting unit does not set the upper limit,

29   for calculating a weighting coefficient based on said rate calculated by

30   said overhead amount correction unit and the transmission rate for the

31   preferential class measured by said rate measuring unit such that the

32   minimally guaranteed rate is assured for the minimum rate guaranteed

33   class among the classes classified by said classification processing

34   unit, said weighting coefficient calculation unit being further operative

35   when said preferential class upper limit setting unit sets the upper

36   limit, for calculating a weighting coefficient based on said rate

37   calculated by said overhead amount correction unit and the upper limit

38   rate set by said preferential class upper limit setting unit such that the

39   minimally guaranteed rate is assured for said minimum rate guaranteed

40   class;

41   a weighting scheduler for scheduling data conforming to said

42   first protocol of said minimum rate guaranteed class and of a

43   weighting applied class among said classified classes based on the

44   weighting coefficient calculated by said weighting coefficient

45   calculation unit to deliver the data in accordance with the scheduling;

46   and

47   a preferential control scheduler for scheduling the data

48   conforming to said first protocol of said preferential class, the data

49   conforming to said first protocol from said weighting scheduler, and

50   data conforming to said first protocol of a best-effort class among said

51   classified classes, such that the data conforming to said first protocol is

52   delivered at a transmission rate equal to or lower than said rate

53   calculated by said overhead amount correction unit, and for

54   preferentially scheduling the data conforming to said first protocol of

55   said preferential class, preferentially scheduling the data conforming to

56   said first protocol from said weighting scheduler at a timing at which

57   there is no data conforming to said first protocol of said preferential

58   class, and delivering the data conforming to said first protocol of the

59   best-effort class at a timing at which there is no data conforming to

60   said first protocol from said weighting scheduler;

61   a protocol converter for converting the data conforming to said first

62   protocol after said scheduling apparatus has shaped the transmission rate

63   therefor to data conforming to said second protocol; and

64   a multiplexer including a current data detector for supplying said

65   scheduling apparatus with said rate information as indicative of a currently set

66   reception rate for said user terminals, said multiplexer being configured to

67   perform DSL processing using telephone lines to transmit to each of said user

68   terminals the data conforming to said second protocol from said protocol

69   converter or the data conforming to said first protocol after said scheduling

70   apparatus has shaped the transmission rate therefor.

1   6 (Original). A network connection system for connecting a first

2   communication network and a plurality of user terminals when a second

3   communication network is interposed between said first communication

4   network and said plurality of user terminals, said second communication

5   network employing a second protocol different from a first protocol employed

6   in said first communication network, said system comprising:

7   a scheduling apparatus including:

8   a classification processing unit for classifying data conforming

9   to said first protocol received from said communication network based

10   on quality guaranteed classes set thereto;

11   an overhead amount correction unit for correcting an overhead

12   amount between a rate based on said second protocol and a rate based

13   on said first protocol to convert received rate information on said

14   second protocol to the rate based on said first protocol;

15   a weighting coefficient calculation unit for calculating a

16   weighting coefficient based on said rate calculated by said overhead

17   amount correction unit and the transmission rate for a preferential class

18   among said classified classes using information fed back from said

19   user terminals such that a minimally guaranteed rate is assured for the

20   minimum rate guaranteed class among the classes classified by said

21   classification processing unit;

22   a weighting scheduler for scheduling data conforming to said

23   first protocol of said minimum rate guaranteed class and of a

24   weighting applied class among said classified classes based on the

25   weighting coefficient calculated by said weighting coefficient

26   calculation unit to deliver the data in accordance with the scheduling;

27   and

28   a preferential control scheduler for scheduling the data

29   conforming to said first protocol of said preferential class, the data

30   conforming to said first protocol from said weighting scheduler, and

31   data conforming to said first protocol of a best-effort class among said

32   classified classes such that the data conforming to said first protocol is

33   delivered at a transmission rate equal to or lower than said rate

34   calculated by said overhead amount correction unit, and for

35   preferentially scheduling the data conforming to said first protocol of

36   said preferential class, preferentially scheduling the data conforming to

37   said first protocol from said weighting scheduler at a timing at which

38   there is no data conforming to said first protocol of said preferential

39   class, and delivering the data conforming to said first protocol of the

40   best-effort class at a timing at which there is no data conforming to

41   said first protocol from said weighting scheduler;

42   a protocol converter for converting the data conforming to said first

43   protocol after said scheduling apparatus has shaped the transmission rate

44   therefor to data conforming to said second protocol; and

45   a multiplexer including a current data detector for supplying said

46   scheduling apparatus with said rate information as indicative of a currently set

47   reception rate for said user terminals, said multiplexer being configured to

48   perform DSL processing using telephone lines to transmit to each of said user

49   terminals the data conforming to said second protocol from said protocol

50   converter or the data conforming to said first protocol after said scheduling

51   apparatus has shaped the transmission rate therefor.

1   7 (Original). A network connection system for connecting a first

2   communication network and a plurality of user terminals when a second

3   communication network is interposed between said first communication

4   network and said plurality of user terminals, said second communication

5   network employing a second protocol different from a first protocol employed

6   in said first communication network, said system comprising:

7   a scheduling apparatus including:

8   a classification processing unit for classifying data conforming

9   to said first protocol received from said communication network based

10   on quality guaranteed classes set thereto;

11   an overhead amount correction unit for correcting an overhead

12   amount between a rate based on said second protocol and a rate based

13   on said first protocol to convert received rate information on said

14   second protocol to the rate based on said first protocol;

15   a preferential class upper limit setting unit, operative when the

16   difference between the transmission rate for a preferential class among

17   said classified classes determined to be using information fed back

18   from said user terminals and said rate calculated by said overhead

19   amount correction unit is lower than a minimally guaranteed rate for a

20   minimum rate guaranteed class among the classes classified by said

21   classification processing unit, for setting an upper limit to the

22   transmission rate for said preferential class for shaping such that the

23   minimally guaranteed rate can be assured for said minimum rate

24   guaranteed class;

25   a weighting coefficient calculation unit, operative when said

26   preferential class upper limit setting unit does not set the upper limit,

27   for calculating a weighting coefficient based on said rate calculated by

28   said overhead amount correction unit and the transmission rate for the

29   preferential class such that the minimally guaranteed rate is assured for

30   said minimum rate guaranteed class, said weighting coefficient

31   calculation unit being further operative when said preferential class

32   upper limit setting unit sets the upper limit, for calculating a weighting

33   coefficient based on said rate calculated by said overhead amount

34   correction unit and the upper limit rate set by said preferential class

35   upper limit setting unit such that the minimally guaranteed rate is

36   assured for said minimum rate guaranteed class;

37   a weighting scheduler for scheduling data conforming to said

38   first protocol of said minimum rate guaranteed class and of a

39   weighting applied class among said classified classes based on the

40   weighting coefficient calculated by said weighting coefficient

41   calculation unit to deliver the data in accordance with the scheduling;

42   and

43   a preferential control scheduler for scheduling the data

44   conforming to said first protocol of said preferential class, the data

45   conforming to said first protocol from said weighting scheduler, and

46   data conforming to said first protocol of a best-effort class among said

47   classified classes such that the data conforming to said first protocol is

48   delivered at a transmission rate equal to or lower than said rate

49   calculated by said overhead amount correction unit, and for

50   preferentially scheduling the data conforming to said first protocol of

51   said preferential class, preferentially scheduling the data conforming to

52   said first protocol from said weighting scheduler at a timing at which

53   there is no data conforming to said first protocol of said preferential

54   class, and delivering the data conforming to said first protocol of the

55   best-effort class at a timing at which there is no data conforming to

56   said first protocol from said weighting scheduler;

57   a protocol converter for converting the data conforming to said first

58 protocol after said scheduling apparatus has shaped the transmission rate

59 therefor to data conforming to said second protocol; and

60   a multiplexer including a current data detector for supplying said

61 scheduling apparatus with said rate information as indicative of a currently set

62 reception rate for said user terminals, said multiplexer being configured to

63 perform DSL processing using telephone lines to transmit to each of said user

64 terminals the data conforming to said second protocol from said protocol

65 converter or the data conforming to said first protocol after said scheduling

66 apparatus has shaped the transmission rate therefor.

1   8 (Original). The network connection system according to claim 1, wherein

2 said current rate detector periodically applies the rate information to said

3 scheduling apparatus at regular time intervals.

1   9 (Original). The network connection system according to claim 1, wherein

2 said current rate detector applies the rate information to said scheduling

3 apparatus when the set rate based on said second protocol is updated.

1   10 (Original). The network connection system according to claim 1, wherein

2   said current rate detector supplies said scheduling apparatus with said rate

3   information as indicative of a transmission rate set between a user terminal

4   and said multiplexer in the event of hand-shaking.

1   11 (Original). The network connection system according to claim 1, wherein

2   said first communication network is an IP network, said data conforming to

3   said first protocol is an IP packet, said second network is an ATM network,

4   and said data conforming to said second protocol is an ATM cell.

1   12 (Original). A traffic shaping method, in a network connection system for

2   connecting a communication network and a plurality of user terminals, for

3   shaping a transmission rate for data conforming to a first protocol from said

4   communication network, said method comprising the steps of:

5   classifying data conforming to said first protocol received from said

6   communication network based on quality guaranteed classes set thereto;

7   correcting an overhead amount between a rate based on a second

8   protocol and a rate based on said first protocol to convert received rate

9   information on said second protocol to the rate based on said first protocol;

10   calculating a weighting coefficient such that a minimally guaranteed

11   rate is assured for a minimum rate guaranteed class among said classified

12   classes based on said calculated rate;

13   scheduling data conforming to said first protocol of said minimum rate

14   guaranteed class and of a weighting applied class among said classified classes

15   based on the calculated weighting coefficient to deliver the data in accordance

16   with the scheduling; and

17   scheduling the data conforming to said first protocol after said

18   weighting, and data conforming to said first protocol of a best-effort class

19   among said classified classes, such that the data conforming to said first

20 protocol is delivered at a transmission rate equal to or lower than said

21 calculated rate, and for preferentially scheduling the data conforming to said

22 first protocol after said weighting, so that the data conforming to said first

23 protocol of said best effort class is delivered at a timing at which there is no

24 data conforming to said first protocol after said weighting.

1 13 (Original). A traffic shaping method, in a network connection system for

2 connecting a communication network and a plurality of user terminals, for

3 shaping a transmission rate for data conforming to a first protocol from said

4 communication network, said method comprising the steps of:

5 classifying data conforming to said first protocol received from said

6 communication network based on quality guaranteed classes set thereto;

7 correcting an overhead amount between a rate based on a second

8 protocol and a rate based on said first protocol to convert received rate

9 information on said second protocol to the rate based on said first protocol;

10 calculating a weighting coefficient such that a minimally guaranteed

11 rate is assured for a minimum rate guaranteed class among said classified

12 classes based on said calculated rate;

13 scheduling data conforming to said first protocol of said minimum rate

14 guaranteed class and of a weighting applied class among said classified classes

15 based on the calculated weighting coefficient to deliver the data in accordance

16 with the scheduling; and

17 scheduling the data conforming to said first protocol after said

18 weighting, such that the data conforming to said first protocol is delivered at a

19 transmission rate equal to or lower than said calculated rate, to deliver the data

20 in accordance with the scheduling.

1 14 (Original). A traffic shaping method, in a network connection system for

2 connecting a communication network and a plurality of user terminals, for

3   shaping a transmission rate for data conforming to a first protocol from said

4   communication network, said method comprising the steps of:

5   classifying data conforming to said first protocol received from said

6   communication network based on quality guaranteed classes set thereto;

7   measuring a transmission rate for a preferential class among said

8   classified classes;

9   correcting an overhead amount between a rate based on a second

10   protocol and a rate based on said first protocol to convert received rate

11   information on said second protocol to the rate based on said first protocol;

12   calculating a weighting coefficient based on said calculated rate and

13   the transmission rate measured for the preferential class such that a minimally

14   guaranteed rate is assured for a minimum rate guaranteed class among the

15   classified classes;

16   scheduling data conforming to said first protocol of said minimum rate

17   guaranteed class and of a weighting applied class among said classified classes

18   based on the calculated weighting coefficient to deliver the data in accordance

19   with the scheduling; and

20   scheduling the data conforming to said first protocol of said

21   preferential class, the data conforming to said first protocol after said

22   weighting, and data conforming to said first protocol of a best-effort class

23   among said classified classes such that the data conforming to said first

24   protocol is delivered at a transmission rate equal to or lower than said

25   calculated rate, and for preferentially scheduling the data conforming to said

26   first protocol of said preferential class, preferentially scheduling the data

27   conforming to said first protocol after said weighting at a timing at which

28   there is no data conforming to said first protocol of said preferential class, and

29   delivering the data conforming to said first protocol of the best-effort class at a

30   timing at which there is no data conforming to said first protocol after said

31   weighting.

1   15 (Original). A traffic shaping method, in a network connection system for

2   connecting a communication network and a plurality of user terminals, for

3   shaping a transmission rate for data conforming to a first protocol from said

4   communication network, said method comprising the steps of:

5   classifying data conforming to said first protocol received from said

6   communication network based on quality guaranteed classes set thereto;

7   measuring a transmission rate for a preferential class among said

8   classified classes;

9   correcting an overhead amount between a rate based on said second

10   protocol and a rate based on said first protocol to convert received rate

11   information on said second protocol to the rate based on said first protocol;

12   when the difference between said measured transmission rate of the

13   data conforming to said first protocol of the preferential class and said

14   calculated rate is lower than a minimally guaranteed rate for a minimum rate

15   guaranteed class among said classified classes, setting an upper limit to the

16   transmission rate for said preferential class for shaping such that the minimally

17   guaranteed rate can be assured for said minimum rate guaranteed class;

18   calculating a weighting coefficient based on said calculated rate and

19   said transmission rate measured for the preferential class such that a minimally

20   guaranteed rate is assured for said minimum rate guaranteed class, when the

21   upper limit rate is not set for said preferential class, and calculating a

22   weighting coefficient based on said calculated rate and said set upper limit rate

23   such that the minimally guaranteed rate is assured for said minimum rate

24   guaranteed class when the upper limit rate is set for said preferential class;

25   scheduling data conforming to said first protocol of said minimum rate

26   guaranteed class and of a weighting applied class among said classified classes

27   based on said calculated weighting coefficient to deliver the data in

28   accordance with the scheduling; and

29   scheduling the data conforming to said first protocol of said

30 preferential class, the data conforming to said first protocol after said

31 weighting, and data conforming to said first protocol of a best-effort class

32 among said classified classes such that the data conforming to said first

33 protocol is delivered at a transmission rate equal to or lower than said

34 calculated rate, preferentially scheduling the data conforming to said first

35 protocol of said preferential class, preferentially scheduling the data

36 conforming to said first protocol after said weighting at a timing at which

37 there is no data conforming to said first protocol of said preferential class, and

38 delivering the data conforming to said first protocol of the best-effort class at a

39 timing at which there is no data conforming to said first protocol after said

40 weighting.

1   16 (Original). A traffic shaping method, in a network connection system for

2   connecting a communication network and a plurality of user terminals, for

3   shaping a transmission rate for data conforming to a first protocol from said

4   communication network, said method comprising the steps of:

5   classifying data conforming to said first protocol received from said

6   communication network based on quality guaranteed classes set thereto;

7   correcting an overhead amount between a rate based on a second

8   protocol and a rate based on said first protocol to convert received rate

9   information on said second protocol to the rate based on said first protocol;

10   calculating a weighting coefficient based on said calculated rate and

11 the transmission rate for a preferential class among said classified classes

12 determined to be using information fed back from said user terminals such that

13 a minimally guaranteed rate is assured for a minimum rate guaranteed class

14 among said classified classes;

15   scheduling data conforming to said first protocol of said minimum rate

16 guaranteed class and of a weighting applied class among said classified classes

17 based on said calculated weighting coefficient; and

18   scheduling the data conforming to said first protocol of said

19   preferential class, the data conforming to said first protocol after said

20   weighting, and data conforming to said first protocol of a best-effort class

21   among said classified classes such that the data conforming to said first

22   protocol is delivered at a transmission rate equal to or lower than said

23   calculated rate, preferentially scheduling the data conforming to said first

24   protocol of said preferential class, preferentially scheduling the data

25   conforming to said first protocol after said weighting at a timing at which

26   there is no data conforming to said first protocol of said preferential class, and

27   delivering the data conforming to said first protocol of the best-effort class at a

28   timing at which there is no data conforming to said first protocol after said

29   weighting.

1   17 (Original). A traffic shaping method, in a network connection system for

2   connecting a communication network and a plurality of user terminals, for

3   shaping a transmission rate for data conforming to a first protocol from said

4   communication network, said method comprising the steps of:

5   classifying data conforming to said first protocol received from said

6   communication network based on quality guaranteed classes set thereto;

7   correcting an overhead amount between a rate based on a second

8   protocol and a rate based on said first protocol to convert received rate

9   information on said second protocol to the rate based on said first protocol;

10   when the difference between the transmission rate for a preferential

11   class among said classified classes determined using information fed back

12   from said user terminals and said calculated rate is lower than a minimally

13   guaranteed rate for a minimum rate guaranteed class among said classified

14   classes, setting an upper limit to the transmission rate for said preferential

15   class for shaping such that the minimally guaranteed rate can be assured for

16   said minimum rate guaranteed class;

17   calculating a weighting coefficient based on said calculated rate and

18   the transmission rate for the preferential class such that the minimally

19   guaranteed rate is assured for said minimum rate guaranteed class, when the

20   upper limit rate is not set for said preferential class, and calculating a

21   weighting coefficient based on said calculated rate and said upper limit rate set

22   for said preferential class such that the minimally guaranteed rate is assured

23   for said minimum rate guaranteed class, when the upper limit rate is set for

24   said preferential class;

25   scheduling data conforming to said first protocol of said minimum rate

26   guaranteed class and of a weighting applied class among said classified classes

27   based on said calculated weighting coefficient; and

28   scheduling the data conforming to said first protocol of said

29   preferential class, the data conforming to said first protocol after said

30   weighting, and data conforming to said first protocol of a best-effort class

31   among said classified classes such that the data conforming to said first

32   protocol is transmitted at a transmission rate equal to or lower than said

33   calculated rate, preferentially scheduling the data conforming to said first

34   protocol of said preferential class, preferentially scheduling the data

35   conforming to said first protocol after said weighting at a timing at which

36   there is no data conforming to said first protocol of said preferential class, and

37   delivering the data conforming to said first protocol of the best-effort class at a

38   timing at which there is no data conforming to said first protocol after said

39   weighting.

1   18 (Original). The traffic shaping method according to claim 12, wherein said

2   first communication network is an IP network, said data conforming to said

3   first protocol is an IP packet, said second network is an ATM network, and

4   said data conforming to said second protocol is an ATM cell.